



New record of Barrio's Frog, *Insuetophrynus acarpicus* Barrio, 1970 (Anura, Rhinodermatidae), in Los Ríos region, Chile

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Abstract

A new record of the Endangered, Chilean endemic *Insuetophrynus acarpicus* (Barrio 1970) is reported from Alerce Costero National Park, Chile. This species of frog is one of the most threatened anurans in the world, and, consequently, any new record of this species is highly important for assessing its known distribution and proposing urgent conservation actions. The new record is the first known site in the Chaihuín river basin, 15 km northwest of a site described by Segura in 2017. The new record fills a gap of the known distribution of *I. acarpicus*.

Keywords

Alerce Costero National Park, endemic species, protected areas, threatened species

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Introduction

Causes of the global decline of amphibians have been the subject of numerous discussions between researchers and conservation groups (Beebee and Griffiths 2005; Muths et al. 2003; Biek et al. 2002; Grant et al. 2019). Some scientists consider that we are facing an event of mass extinction comparable to other major extinction events in the history of the earth (e.g. McCallum 2007). The decline in amphibian populations is explained by pollution, the introduction of invasive species, diseases, deforestation, climate change, and habitat degradation (Múgica Nava 1993; Antón et al. 2001).

Habitat degradation may be the most important threat to populations of Barrio's Frog, *I. acarpicus* (Barrio 1970), an endemic species in Chilean *Nothofagus* forests (Formas et al. 1980) with a restricted geographical distribution (Rabanal and Nuñez 2012). According to the

IUCN (IUCN SSC Amphibian Specialist Group 2018) this Endangered species is highly sensitive to changes in its environment. Furthermore, changes can act synergistically, enhancing or magnifying their negative, cumulative effects on amphibian populations in Chile (Lobos et al 2013). Threats faced by this population also include non-evident changes, such as pollution inside protected areas (Rodriguez-Jorquera et al. 2017), and make it relevant to update this species distribution.

Methods

Fieldwork was done in 2018 on the Chaihuín river in Alerce Costero National Park, Chile, to collect data on riverbank species of mammals and amphibians. Kayaks were used to search points every 2 km along the river

in areas otherwise inaccessible by foot. We found one individual of *I. acarpicus* on the river bank, resting in water. We captured the individual, photographed it, and released it. The site has leaf litter and woody debris deposited by winter floods. This river is a fourth order stream according to Strahler's classification system (Strahler 1957). Vegetation at the site consists of evergreen forest species, mainly trees belonging to the family Myrtaceae (Fig. 1A, B).

Results

New record. CHILE • 1; Los Ríos region, Valdivia province, Alerce Costero National Park, Chaihuín river; 40°03'S, 073°23'W; 177 m a.s.l.; 13 Feb. 2018; Patricio Contreras leg.

Identification. The genus *Insuetophrynus* is identified by a firmisternal pectoral girdle and a lack of ossification of the carpal bones (Rabanal and Nuñez 2012). The general form, pattern, and coloration, along with the habitat features where we located the specimen, were used for the identification (Fig. 1), which was done in the field and later confirmed from our photographs. We considered the prominent eyes with horizontal pupils (Fig. 1C) and the habitat near the riverbank. Furthermore, we sent our photographs to specialists Felipe Rabanal and Cesar Cuevas, who confirmed our identification.

Discussion

Insuetophrynus acarpicus is an almost exclusively aquatic frog, inhabiting coastal streams with stones and mud (Rabanal and Formas 2009). The larval period can last at least 11–12 months (Formas et al. 1980). Adults are active during night but remain hidden under flat stones (slate) during the day (Díaz et al. 1983). The general coloration of adults varies from brown to dark gray. The body is robust, with strong limbs which are 35–55 mm long (Fig. 1C, D). The skin has scattered granulations on the back and along the edges of the abdomen (Rabanal and Nuñez 2008). The color and morphology of this species make it relatively easy to distinguish it from all other amphibians in the area. Recent studies (Blotto et al. 2013) show that its closest living relative is the genus *Rhinoderma* Duméril & Bibron, 1841, which is surprising given the greatly different morphology of these genera.

The evolutionary singularity, reduced geographic distribution, and deforestation of the environment in the species distribution range (Fig. 2), make this species one of the most threatened in the country. Furthermore, *I. acarpicus* is one of the most threatened frog species in the world, classified as Endangered by the IUCN (IUCN SSC Amphibian Specialist Group 2018) based on its reduced geographic distribution and habitat loss and fragmentation (IUCN SSC Amphibian Specialist Group 2018). It is tenth in rank on the Edge of Existence Catalog



Figure 1. Habitat and photographic record of *Insuetophrynus acarpicus* in the Chaihuín river basin in the Alerce Costero National Park. **A.** Dominant river vegetation at the newly found location. **B.** *Insuetophrynus acarpicus* among fallen leaves and woody debris on the banks of the Chaihuín river. **C.** Dorsal view of individual showing horizontal pupil. **D.** Detail of the robust body and its grainy, brown to green skin.

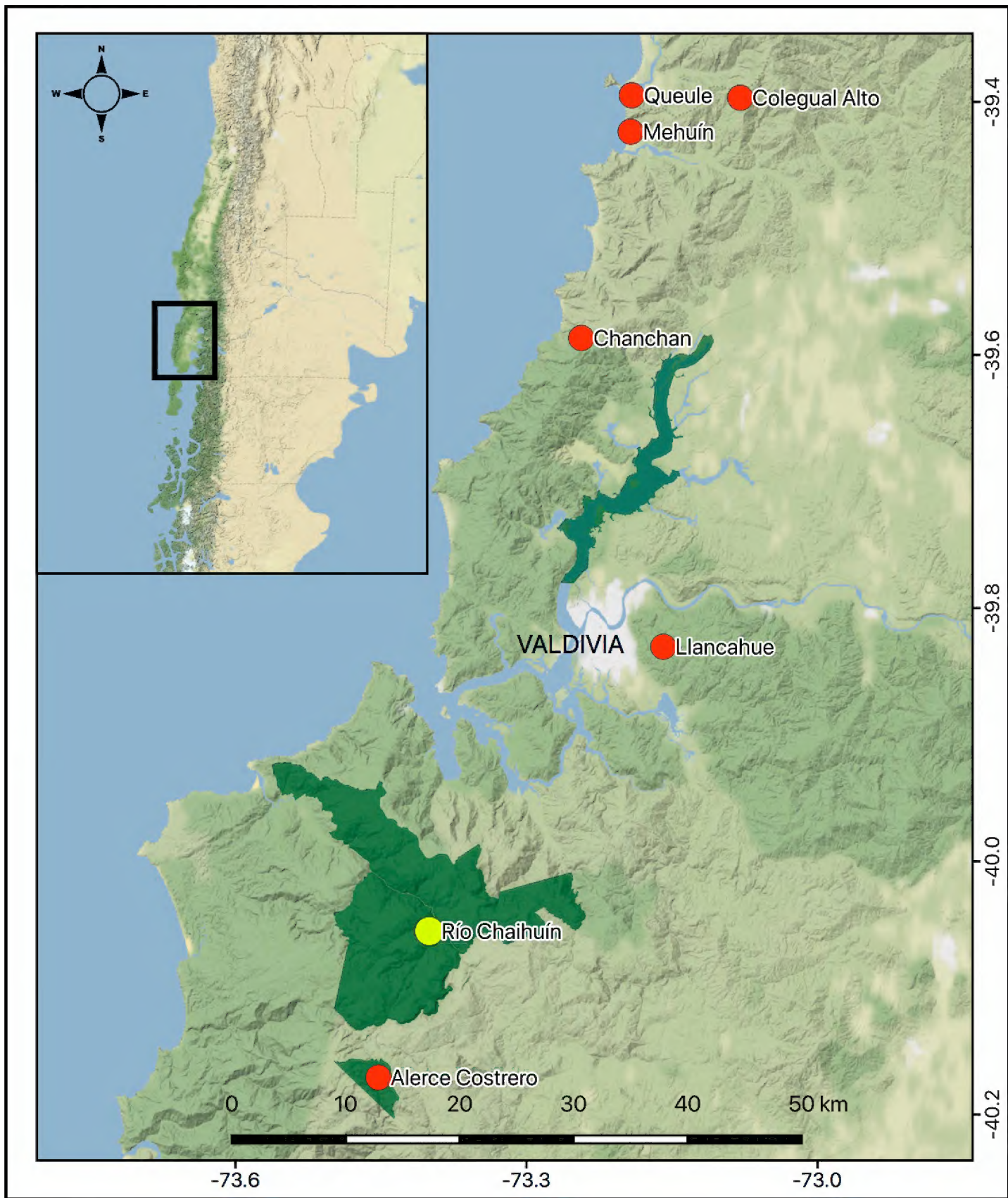


Figure 2. Distribution of *Insuetophrynus acarpicus* in Chile. Red circles indicate the previously known locations. The yellow circle indicates the new record. Map data by OpenStreetMap, under ODbL 2020.

<http://www.edgeofexistence.org/species/barrios-frog/>) of the most endangered and evolutionary distinct amphibians species.

Since its description (Barrio 1970), *I. acarpicus* has only been known from Mehuín, its type locality. In 2002, it was recorded at two more locations (Soto et al. 2002), and in 2012 it was found at a fourth location (Rabanal and Núñez 2012; Table 1). All of these records were from the

Table 1. Population records of *Insuetophrynus acarpicus* according to different authors.

Site	Latitude	Longitude	Altitude a.s.l. (m)	Reference
Queule	39°38'S	073°14'W	124	Soto et al. 2002
Colegual Alto	39°24'S	073°06'W	500	Soto et al. 2002
Mehuín	39°26'S	073°13'W	80–90	Méndez et al. 2006; Rabanal and Núñez 2012
Chanchan	39°36'S	073°16'W	486	Rabanal and Núñez 2012
Llancahue	39°50'S	073°10'W	182	Parada et al. 2017
Alerce Costero	40°11'S	073°27'W	700	Segura 2017
Río Chaihuín	40°03'S	073°23'W	177	This report

coastal area in the regions of La Araucanía and Los Ríos, Chile, within a radius of about 30 km in an area highly fragmented by exotic tree plantations. In 2017, two new records were made 40 km southwest (Parada et al. 2017) and 90 km southwest (Segura 2017), the record farthest into the Bueno river basin in Alerce Costero National Park. Our new record fills a geographic gap between previous locations. We raise the urgent need for an action plan and strategies for adaptive management for the conservation of *I. acarpicus*, focusing on current threats and considering the management capacity at Alerce Costero National Park.

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Authors' Contributions

IRJ and PC participated in the fieldwork and contributed to the writing of the manuscript. FB participated in the fieldwork, took photographs of the specimen, and contributed to the writing of the manuscript. IRJ translated the manuscript to English.

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